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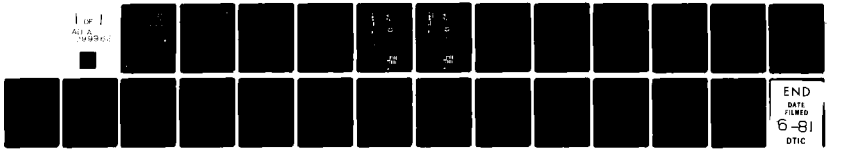

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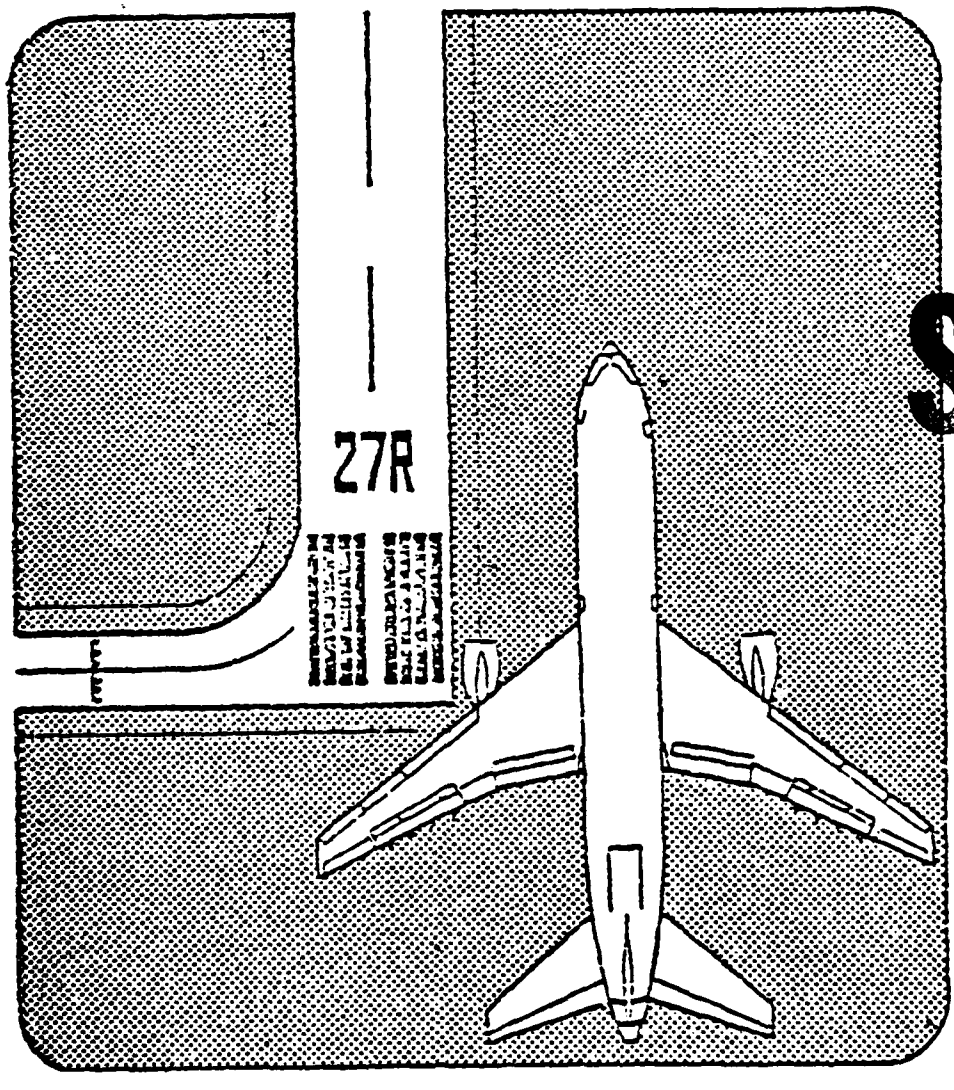

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

DATE: November 30, 1978

NATIONAL AVIATION FACILITIES
EXPERIMENTAL CENTER
ATLANTIC CITY, NEW JERSEY 08405

IN REPLY REFER TO: ANA-220

SUBJECT: Input Data for Miami Simulation Model Calibration and Annual Delay Baseline Experiments

FROM: NAFEC Program Manager, ANA-220

TO: Ray Fowler, AEM-100

Enclosed are preliminary data packages for use during the second Task Force meeting on December 8, 1978.

. Attachments A, B, and C contain the Miami Airport Configurations, the preliminary calibration data package, and the preliminary annual delay baseline data package, respectively.

These attachments should be reviewed, revised, and approved by the Miami Task Force prior to use in model runs.

John R. VanderVeer

JOHN R. VANDERVEER

3 Enclosures

Attachment A

MIAMI AIRPORT CONFIGURATIONS.

Miami International Airport.

Data Package Number 1.

~~Miami~~
Airport Improvement Task Force Delay Studies.

(12) 251

(11) December 1978

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Miami Airport Configuration

There are two basic configurations (for the airport) selected for study by the Miami Task Force. All the experiments considered in the technical plan can be performed using one of the following configurations. The variation of the input (such as runway assignments for arrivals and departures) can control the experiment to reflect the desired conditions of the test.

The two configurations are:

	Model Runway No.			
Configuration	1	2	3	
A. Runways	9R	9L	12	(See Figure 1)
B. Runways	27R	27L	30	(See Figure 2)

The link-node diagram for the airport required to develop the route structure for each configuration is shown in figure 3.

Arrival Fix identification and codes are:

Fixes	Fix Names	Code	
L	Lonni	1	
O	Owner	2	
F	Famin	3	
W	Westo	4	SE, SW, & NW
FLL	Fort Lauderdale	5	Quadrants assigned
BSY	Biscayne Bay	6	to these
MIA	Miami	7	fixes
NE	North East Quadrant	8	

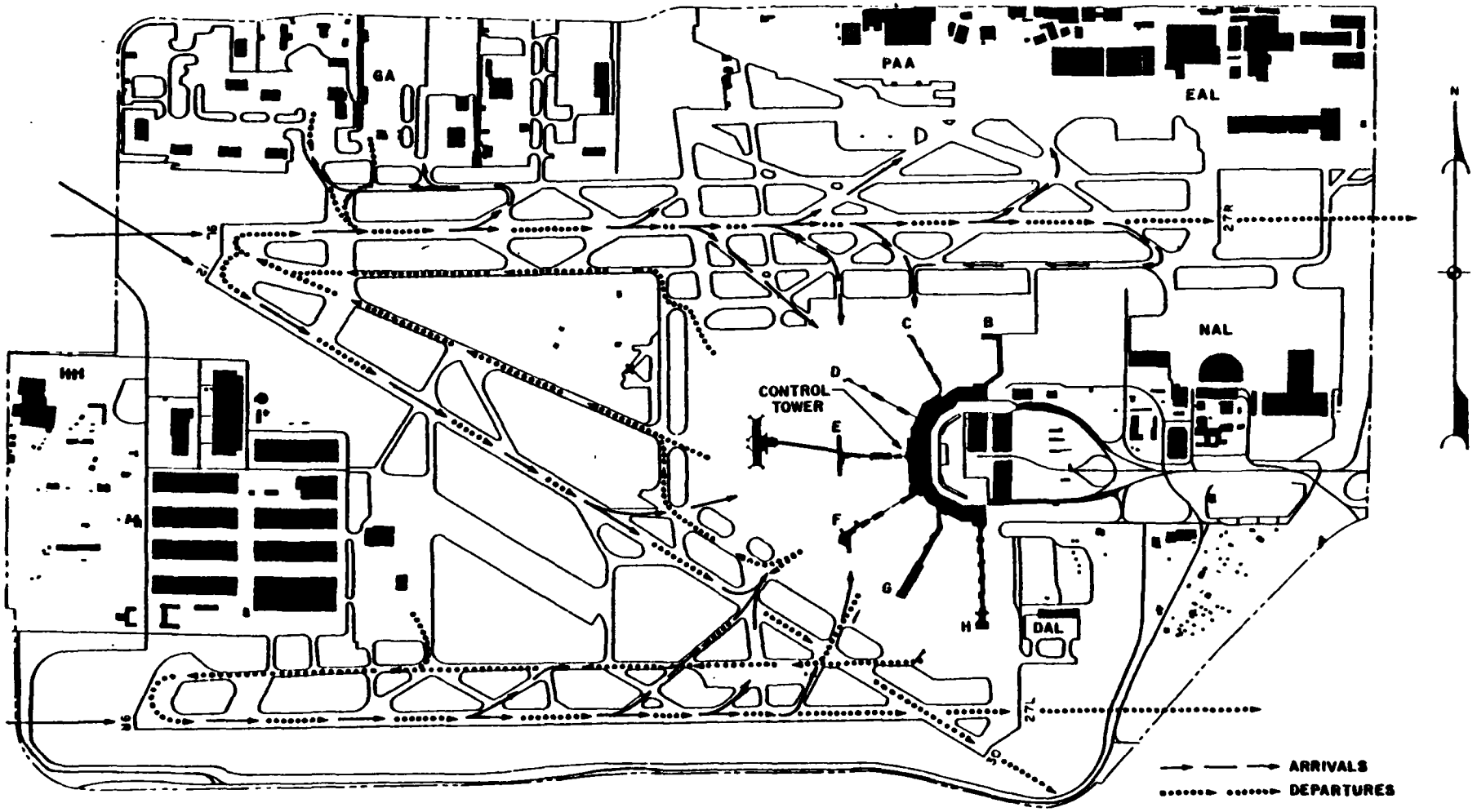


Figure 1

MIAMI INTERNATIONAL AIRPORT
C-0380 HJL 7-13-76

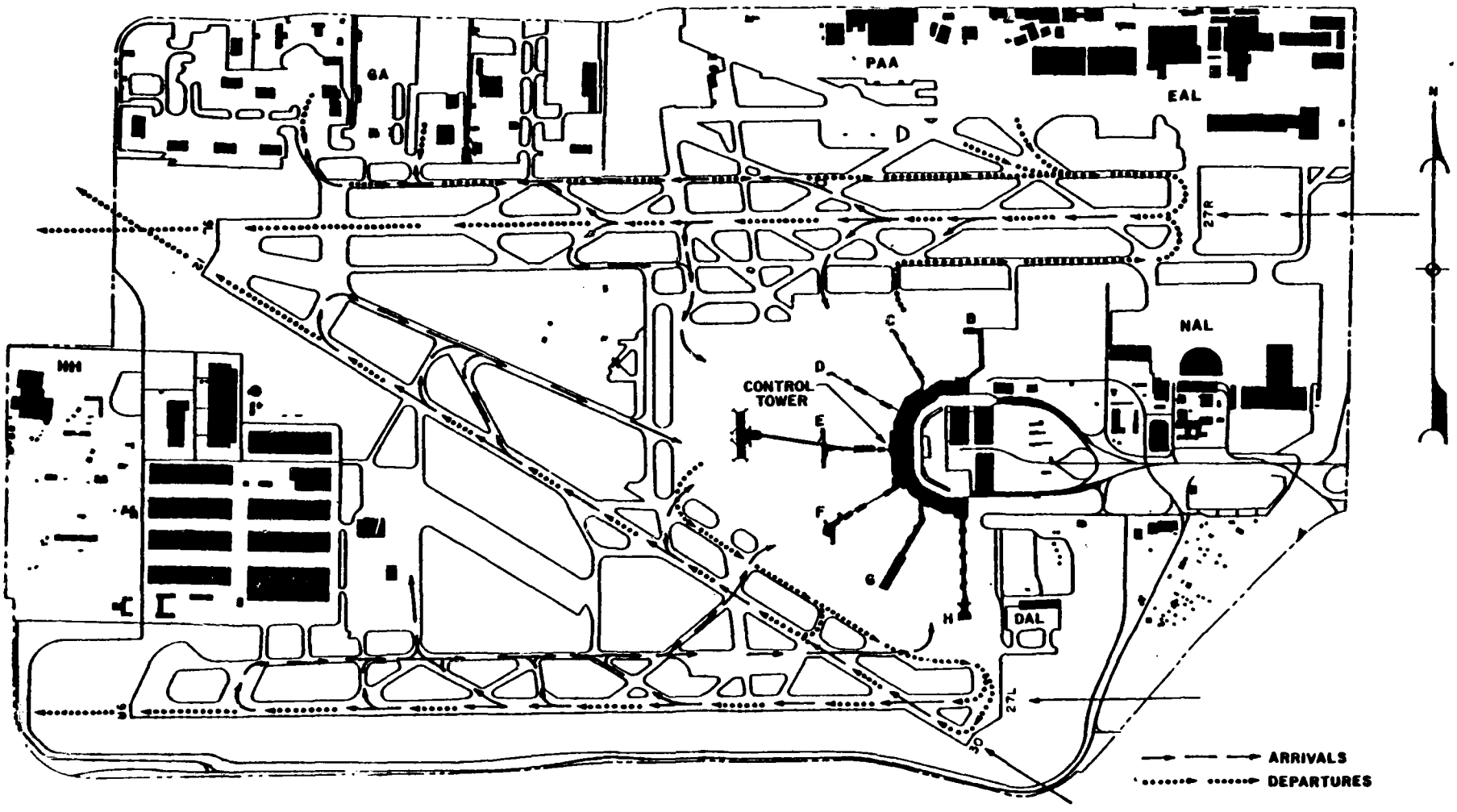


Figure 2

MIAMI INTERNATIONAL AIRPORT
C-0380 HJL 7-13-76

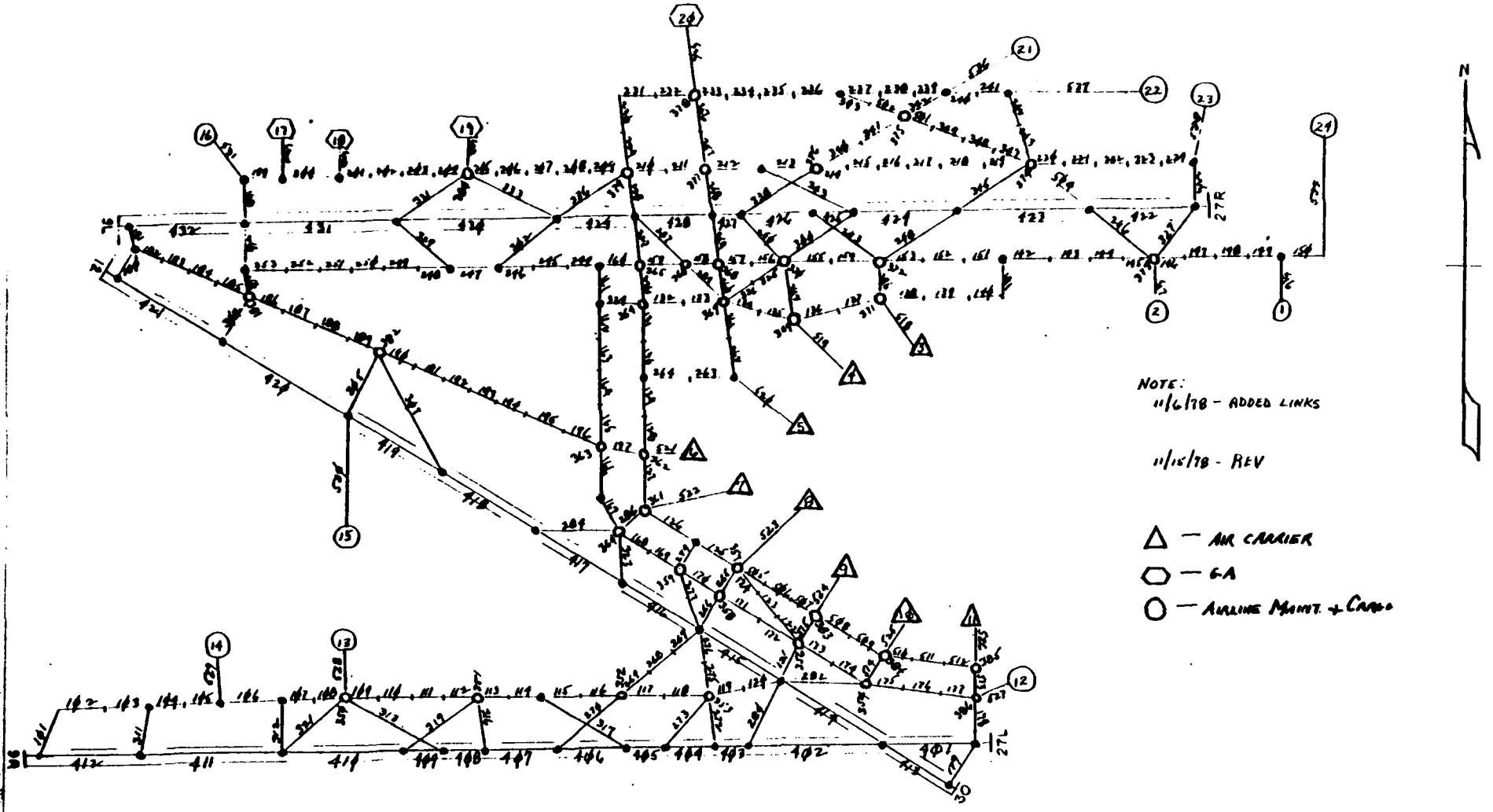


Figure 3

MIAMI INTERNATIONAL AIRPORT

10/12/78

Attachment B

PRELIMINARY CALIBRATION DATA PACKAGE

Miami International Airport

Miami
Airport Improvement Task Force Delay Studies

December 1978

CALIBRATION MODEL
INPUT DATA

A. LOGISTICS

1. Title: Miami International Airport Airfield Simulation Model Calibration Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981
   7137, 8099, 9355, 0123, 1985

3. Start and Finish Times: November 1, 1978
   16:00 to 19:00 (Gmt), 11:00(a.m.) to 14:00 (p.m.)

4. Print Options: Detailed run for one random number seed.
   Summary run for ten random number seeds.

5. Airline Names:

AIR CARRIERS

Code	Name	Code	Name
AC	AIR CANADA	LB	BOLIVIANA
AF	AIR FRANCE	IX	(INAIR) PANAMA
AM	AIR MEXICO	JM	AIR JAMAICA
AR	AEROLINEAS (ARGENTINA)	KQ	CAYMAN AIR (ALSO KX)
AV	AVIANCA	KS	SATURN AIRWAYS
BA	BRITISH AIRWAYS (SPEEDBIRD)	LA	LAN CHILE (ALSO LN)
BN	BRANIFF	LM	ALM DUTCH (ANTILLIAN)
BW	BRITISH (WEST INDIAN)	LR	LACSA
ST	BELIZE	MI	(MACKEY) INTERNATIONAL
CC	AEROCOSTA	MM	(SAM) COLOMBIA
CF	FAWCETT	MX	MEXICANA
CJ	CARIB WEST	NA	NATIONAL
CL	CAPITOL	NC	NORTH CENTRAL
CO	CONTINENTAL	ND	NORDAIR
DL	DELTA	NI	LANICA
DO	DOMINICANA	NW	(NORTHWEST) ORIENT
EA	EASTERN	OD	AERO CONDOR
ED	ANDES	OP	AIR PANAMA
EU	ECUATORIANA (ALSO EQ)	OV	OVERSEAS NATIONAL
GU	AVIATECA	PA	PAN AMERICAN (CLIPPER)
HJ	AIR HAITI	PL	AERO PERU (PERUVIAN)
IB	IBERIAN	PT	NAPLES
AER	ARGENTINA	TAR	ARGENTINA
LAB	BOLIVIA	AA	AMERICA AIRLINES
AESA	EL SALVADOR		

AIR CARRIERS continued

Code	Name	Code	Name
RD	(AIRLIFT) INTERNATIONAL	TX	(TAN) HONDURAS
RI	(RICH) INTERNATIONAL RIA	UA	UNITED
SJ	(SOUTHERN AIR) TRANSPORT	BH	BAHAMAS AIR
SL	(SOUTHEAST) AIRLINES	UV	UNIVERSAL
TA	TACA	VA	VIASA
TD	TRANS CARGA	WD	WARDAIR CANADA
TV	TRANS INTERNATIONAL	WO	WORLD AIRWAYS
TW	TRANS WORLD	WA	WESTERN AIRLINES
	SPAN EAST AIRLINES	RG	VARIG

AIR TAXIS

AAT	AIR SUNSHINE (AMAIR)	PLM	AIR FLORIDA (PALM)
AOH	AIR OHIO	XW	SHAWNEE
FDA	FLORIDA AIR LINES	ORA	OCEAN REEF
		CRW	COURIER WINGS
MCS	MARCO ISLAND AIRWAYS	VW	AIR MIAMI

OTHER

		FT	FLYING TIGER LINE
L	LOGAIR	EG	(EXECUTIVE JET) AVIATION
SKT	SKY FREIGHTER	FLM	FLEMING
FDE	FEDERAL EXPRESS	AAL	ARGOSY

6. Processing Options: First run to check input. Other runs in COMPUTE mode.

7. Truncation Limits: ±3 standard deviations

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See link node diagram.

10. Number of Runways: 3

11. Runway Identification: 9R, 9L, 12

12. Departure Runway End Links: 101, 181, 180

13. Runway Crossing Links: See runway crossing times (36)

14. Exit Taxiway Location:

9L END		9R END	
432	1232'	412	1120'
431	2682'	411	2470'
430	4222'	410	3630'
429	4972'	409	4000'
428	5732'	408	4400'
427	5992'	407	5110'
426	6702'	406	5770'
425	7062'	405	6140'
424	8052'	404	6650'
423	9292'	403	6980'
422	10312'	402	8310'
27R END	10453'	401	9200'
		27L END	9358'

12 END	
421	1309'
420	2689'
419	3739'
418	4799'
417	5769'
416	6649'
415	7589'
414	8759'
413	9509'
30 END	9575'

15. Holding Areas: See link node diagram

16. Airline Gates:

17. General Aviation Basing Areas:

C. ATC PROCEDURES

18. Aircraft Separations: Minimum

Arrival-Arrival Separation (nmi)

1. VFR: Accounting to Report No. FAA-EM-78-8A

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.9	1.9	1.9	1.9
	B	1.9	1.9	1.9	1.9
	C	2.7	2.7	1.9	1.9
	D	4.5	4.5	3.6	2.7

2. IFR: Calibration to be done includes VFR only.

Departure-Departure Separations (seconds):

1. VFR:

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	35	35	45	50
	B	35	35	45	50
	C	50	50	60	60
	D	120	120	120	90

2. IFR: Calibration to be done includes VFR only.

Departure-Arrival Separation (nmi):

1. VFR:

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.35	1.35	1.35	1.35
	B	1.35	1.35	1.35	1.35
	C	1.65	1.65	1.65	1.65
	D	1.77	1.77	1.77	1.77

2. IFR: Calibration to be done includes VFR only.

Arrival-Departure Separation (seconds):

1. VFR:

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	48	48	48	48
	B	46	46	46	46
	C	52	52	52	52
	D	56	56	56	56

2. IFR: Calibration to be done includes VFR only.

19. Route Data: 10% complete

20. Two-Way Path Data: 352, 116, 115, 114, 113, 351,.....
142, 143, 144, 145, 373, 517
212, 377, 211, 210, 109,.....

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	3.0
B	3.0
C	7.0
D	7.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 4 minutes.

23. Departure Runway Queue Control:

Aircraft are assigned departure runways to preclude airspace crossovers, not to balance departure queues.

24. Gate Hold Control:

Aircraft are held at gates when departure queue at runway is four or more, except when gate holds would cause gate congestion.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap: (Runway 27R. queue=6 A/C)

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 10 minutes or an equivalent queue of 6 aircraft.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 1.5 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

Observed
Runway 9R Exit Link No./Probability of Use

CLASS/LINK	178	280	272	273	317	270	316	319	321	311
A										1.00 (1)
B	.11 (3)	.07 (2)				.37 (10)	.07 (2)	.19 (5)	.15 (4)	.04 (1)
C	.15 (33)	.15 (31)	.02 (5)	.40 (84)	.02 (5)	.24 (53)	.01 (3)	.01 (3)		
D	.07 (5)	.39 (27)	.05 (3)	.33 (23)		.16 (11)				

Observed
Runway 12 Exit Link No./Probability of Use

CLASS/LINK		282	121	266	323	284				
A										
B			1.00 (1)							
C		.20 (2)	.20 (2)	.40 (4)	.10 (1)	.10 (1)				
D				1.00 (2)						

Note: ( ) in table indicates number of data points

OBSERVED

RUNWAY 9L EXIT LINK NO./PROBABILITY OF USE

CLASS/LINK	343	338	258	228	336	333	331	198	296	298	293	290	259	227	329	255
A	.07 (1)	.07 (1)			.07 (1)		.58 (8)	.07 (1)					.07 (1)		.07 (1)	
B	.02 (2)	.03 (3)	.05 (5)	.09 (8)	.10 (8)	.17 (16)	.27 (25)	.03 (3)			.01 (1)	.05 (5)	.02 (2)	.10 (9)	.05 (5)	.01 (1)
C	.02 (4)	.04 (8)	.02 (5)	.03 (6)	.04 (9)	.05 (10)				.03 (6)	.24 (48)	.35 (74)	.12 (25)	.06 (13)		
D	.04 (2)	.08 (3)							.03 (1)	.13 (5)	.45 (18)	.23 (9)		.04 (2)		

29. ARRIVAL RUNWAY OCCUPANCY TIMES

RUNWAY 9R OCCUPANCY TIMES
(SECONDS)

Exit Link	(1) 278	(2) 280	(3) 272	(4) 273	(5) 317	(6) 270	(7) 316	(8) 319	(9) 321								
Class A																	
B	22 (1)	60 (2)				53 (10)	55 (2)	40 (5)	30 (3)								
C	77 (24	60 (30)	51 (5)	52 (80)	48 (5)	49 (48)	55 (3)	43 (3)									
D	76 (5)	64 (26)	67 (3)	52 (22)		54 (10)											

RUNWAY 9L OCCUPANCY TIMES
(SECONDS)

Exit Link	(3) 345	(4) 343	(5) 338	(6) 258	(7) 228	(8) 336	(9) 333	(10) 331	(11) 198	(14) 298	(15) 293	(16) 290	(17) 259	(18) 227	(20) 329	(21) 255	
Class A		47 (1)	62 (1)			54 (1)		40 (7)	22 (1)				66 (1)		63 (1)		
B		64 (2)	47 (3)	53 (5)	53 (8)	45 (6)	46 14)	35 (21)	30 (1)		65 (1)	56 (5)	62 (2)	46 (9)	33 (5)	30 (1)	
C	80 1)	61 (4)	54 (8)	52 (5)	52 (6)	44 (8)	50 10)			59 (6)	48 47)	47 (72)	46 (25)	40 (13			
D		56 (2)	55 (3)							58 (5)	47 18)	49 (9)		40 (2)			

RUNWAY 12 OCCUPANCY TIMES
(SECONDS)

Exit Link	(1) 282	(2) 121	(3) 266	(4) 323	(5) 284												
Class A																	
B		66 (1)	33 (1)														
C	60 (2)	68 (2)	63 (3)	44 (1)	35 (1)												
D			48 (2)														

30. TOUCH AND GO OCCUPANCY TIMES: N/A

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (Seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: 5.00, 10.00, 15.00, 20.00, 25.00, 30.00

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	100	5
B	120	5
C	130	5
D	140	5

34. Gate Service Times: Not applicable to calibration

35. Airspace Travel Times:

FIX	RUNWAY	CLASS	TRAVEL TIME (min)	FIX ID	RUNWAY NAME	NUMBER OF DATA POINTS
1	1	1	11.0	L	9R	12
1	1	2	11.5	L	9R	57
1	1	3	——	L	9R	0
1	1	4	——	L	9R	0
1	2	1	11.0	L	9L	6
1	2	2	11.0	L	9L	79
1	2	3	8.5	L	9L	15
1	2	4	8.5	L	9L	1
1	3	1	——	L	12	0
1	3	2	6.0	L	12	4
1	3	3	——	L	12	0
1	3	4	——	L	12	0
1	4	1	9.5	L	27R	7
1	4	2	9.5	L	27R	39
1	4	3	9.5	L	27R	3
1	4	4	——	L	27R	0
1	5	1	——	L	27L	0
1	5	2	9.5	L	27L	4
1	5	3	——	L	27L	0

FIX	RUNWAY	CLASS	TRAVEL TIME (min)	FIX ID	RUNWAY NAME	NUMBER OF DATA POINTS
1	5	4	—	L	27R	0
2	1	1	10.0	O	9R	27
2	1	2	10.0	O	9R	46
2	1	3	11.0	O	9R	2
2	1	4	—	O	9R	0
2	2	1	11.0	O	9L	12
2	2	2	11.5	O	9L	21
2	2	3	12.5	O	9L	9
2	2	4	—	O	9L	0
2	4	1	—	O	27R	0
2	4	2	8.5	O	27R	4
2	4	3	—	O	27R	0
2	4	4	—	O	27R	0
2	5	1	9.5	O	27L	1
2	5	2	9.5	O	27L	1
2	5	3	—	O	27L	0
2	5	4	—	O	27L	0
2	6	1	8.0	O	30	7
2	6	2	8.0	O	30	16
2	6	3	9.0	O	30	2
2	6	4	—	O	30	0
3	1	1	9.0	F	9R	4
3	1	2	9.5	F	9R	38
3	1	3	9.5	F	9R	5
3	1	4	—	F	9R	0
3	2	1	8.5	F	9L	7
3	2	2	9.0	F	9L	7
3	2	3	—	F	9L	0
3	2	4	—	F	9L	0
3	3	1	—	F	12	0
3	3	2	6.0	F	12	2
3	3	3	—	F	12	0
3	3	4	—	F	12	0
3	4	1	9.5	F	27R	1
3	4	2	—	F	27R	0
3	4	3	—	F	27R	0
3	4	4	—	F	27R	0
3	5	1	—	F	27L	0
3	5	2	14.0	F	27L	1
3	5	3	—	F	27L	0
3	5	4	—	F	27L	0
3	6	1	9.5	F	30	4
3	6	2	10.5	F	30	12
3	6	3	—	F	30	0
3	6	4	—	F	30	0

FIX	RUNWAY	CLASS	TRAVEL TIME(min)	FIX ID	RUNWAY NAME	NUMBER OF DATA POINTS
4	1	1	8.0	W	9R	21
4	1	2	8.0	W	9R	49
4	1	3	10.0	W	9R	1
4	1	4	——	W	9R	0
4	2	1	8.5	W	9L	9
4	2	2	8.5	W	9L	70
4	2	3	10.5	W	9L	26
4	2	4	10.5	W	9L	6
4	3	1	8.0	W	12	2
4	3	2	8.0	W	12	3
4	3	3	——	W	12	0
4	3	4	——	W	12	0
4	4	1	10.0	W	27R	2
4	4	2	10.0	W	27R	7
4	4	3	——	W	27R	0
4	4	4	——	W	27R	0
4	5	1	10.5	W	27L	2
4	5	2	——	W	27L	0
4	5	3	——	W	27L	0
4	5	4	——	W	27L	0
4	6	1	9.5	W	30	4
4	6	2	9.5	W	30	26
4	6	3	——	W	30	0
4	6	4	——	W	30	0
5	1	1	——	FLL	9R	0
5	1	2	9.5	FLL	9R	1
5	1	3	——	FLL	9R	0
5	1	4	——	FLL	9R	0
5	2	1	——	FLL	9L	0
5	2	2	6.0	FLL	9L	3
5	2	3	6.0	FLL	9L	1
5	2	4	——	FLL	9L	0
5	3	1	——	FLL	12	0
5	3	2	11.5	FLL	12	1
5	3	3	——	FLL	12	0
5	3	4	——	FLL	12	0
6	1	1	——	BSY	9R	0
6	1	2	7.0	BSY	9R	2
6	1	3	7.0	BSY	9R	1
6	1	4	7.0	BSY	9R	1
6	2	1	——	BSY	9L	0
6	2	2	12.5	BSY	9L	1
6	2	3	——	BSY	9L	0
6	2	4	——	BSY	9L	0

Attachment C

PRELIMINARY ANNUAL DELAY BASELINE DATA PACKAGE

Miami International Airport

Miami
Airport Improvement Task Force Delay Studies

December 1978

FIX	RUNWAY	CLASS	TRAVEL TIME(min)	FIX ID	RUNWAY NAME	NUMBER OF DATA POINTS
7	1	1	—	MIA	9R	0
7	1	2	6.0	MIA	9R	1
7	1	3	—	MIA	9R	0
7	1	4	—	MIA	9R	0
7	2	1	—	MIA	9L	0
7	2	2	—	MIA	9L	0
7	2	3	6.0	MIA	9L	3
7	2	4	6.0	MIA	9L	1
8	2	1	—	NE	9L	0
8	2	2	—	NE	9L	0
8	2	3	6.0	NE	9L	5
8	2	4	6.0	NE	9L	1

36. Runway Crossing Times: Clearance Times (sec)

LINK	RWY	CLASS OF ARR ON RWY				CLASS OF DEP ON RWY				CLASS OF ARR ON FINAL			
		1	2	3	4	1	2	3	4	1	2	3	4
227	9L	47	43	42	46	47	47	42	42	20	20	20	20
228	9L	47	43	42	46	47	47	42	42	20	20	20	20
258	9L	51	49	46	50	47	47	42	42	20	20	20	20
259	9L	51	49	46	50	47	47	42	42	20	20	20	20
267	12	56	52	46	48	47	47	42	42	20	20	20	20
266	12	56	52	46	48	47	47	42	42	20	20	20	20
121	12	56	52	46	48	47	47	42	42	20	20	20	20
280	12	56	52	46	48	47	47	42	42	20	20	20	20
282	12	56	52	46	48	47	47	42	42	20	20	20	20

37. Lateness Distribution: Not applicable to calibration.

38. Demand: To be based on reduced field data.

1. Annual Demand: 346,384 (FY-78)

2. Group Specification:

3 day groups : High, Average, Low
12 week groups : 12 months, October through September
2 weather groups: VFR, IFR1 (No IFR2 conditions)

2 runway uses :	Arrivals Runway	Departures Runway
1.	9R, 9L, 12	9R, 9L, 12
2.	27R, 27L, 30	27R, 27L, 30

3., 4. Traffic Distribution: (FY 1978 Tower Count)

	1978								1977			
Week Group	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
% of annual in one week	1.95	2.03	2.14	2.04	1.87	1.72	1.92	1.93	1.86	1.72	1.86	1.97
Number of weeks in month	4.43	4.00	4.43	4.29	4.43	4.29	4.43	4.43	4.29	4.43	4.29	4.43
% of annual in month	8.64	8.12	9.48	8.75	8.28	7.39	8.50	8.53	7.98	7.64	7.98	8.71

5., 6. Daily Traffic Distribution: (March 1978, combined 2-week period 3/12/78 to 3/25/78)

Day Group	High	Average	Low
% of weekly in one day	15.74	14.30	12.81
Number of days	2	3	2
% of weekly traffic in day group	31.47	42.90	25.63

7. Weather Occurrences:

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	De
%VFR	97.27	96.15	95.78	97.95	99.75	98.97	100.00	99.75	99.74	99.75	99.23	99.
%IFR1	2.73	3.85	4.22	2.05	0.25	1.03	0.00	0.25	0.26	0.25	0.77	0.

8. Hourly Runway Capacity Parameters:

Runway Use	Hourly Capacity (Operations/hour) VFR	IFR1	
1	101	93	(To be verified by rerunning Capacity Model)
2	117	90	

9. Runway Use/Weather Group Demand Factors:

For all runway uses:

Weather VFR	IFR1
1.0	1.0

10. Runway Use Occurrences:

Runway Use	Percent Occurrence VFR	IFR1
1	72.13	27.41
2	27.87	72.59
	100.00	100.00

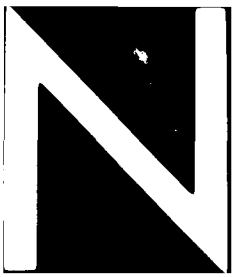
11. Hourly Traffic: (March 16, 1978)

Hour	%daily traffic	Hour	%daily traffic	Hour	%daily traffic	Hour	%daily traffic
00-01	3.7	06-07	1.4	12-13	2.5	18-19	8.4
01-02	4.4	07-08	1.5	13-14	5.9	19-20	6.4
02-03	2.7	08-09	0.4	14-15	5.7	20-21	7.5
03-04	4.1	09-10	0.8	15-16	2.8	21-22	9.4
04-05	2.0	10-11	1.3	16-17	7.4	22-23	4.8
05-06	3.6	11-12	2.1	17-18	4.5	23-24	6.7

12, 13. Delay Curve Specification: To be determined after airfield simulation runs.

14. Percent Arrivals:

Hour	%Arrivals	Hour	%Arrivals	Hour	%Arrivals	Hour	%Arrivals
00-01	54.8	06-07	62.5	12-13	17.9	18-19	47.9
01-02	62.0	07-08	64.7	13-14	27.3	19-20	36.1
02-03	63.3	08-09	20.0	14-15	23.4	20-21	60.7
03-04	26.1	09-10	0.0	15-16	61.3	21-22	59.4
04-05	82.6	10-11	60.0	16-17	70.7	22-23	40.7
05-06	68.3	11-12	29.2	17-18	60.8	23-24	52.0

15. Cancellation Diversion Specification: To be provided by Task Force.

16. User-Specified Title: MIA ANNUAL BASELINE